Rivers & Streams

Missouri Currents

MISSOURI DEPARTMENT OF CONSERVATION

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Dynamic Waters

Missouri's rivers and streams are diverse habitats with incredible plant and animal life. A single stream is dynamic, a host to thousands of species. Streams vary from one corner of the state to the next–in size, shape, length, rate of flow, stream bed composition, plants and animals and water quality. Above all else, streams are exciting places. Fishing, boating, canoeing, wading and hunting all bring you to the stream to relax and enjoy the flowing waters.

Streams share many features. Gravity pulls the water in a stream from higher levels to lower levels; water moves downhill. Some streams carry large amounts of water because of the extensive watersheds that drain into them. The amount of water carried by any stream also varies according to the amount of rainwater or snow melt that occurs in the watershed, changing each season. The speed of a stream is also affected by its slope. The steeper the streambed, the greater the speed of the water flow or current.

Streams have distinct areas within them. **Pools** are deep, calm waters. They are often formed behind large objects, such as boulders and rootwads of fallen trees, where water is diverted. They provide good habitat for fish to rest. **Riffles** are bubbly sections of shallow streams that appear as white water where the streams flows over rocks. The bubbling oxygenates water, providing an important function for streams. The **channel** is where the largest volume of water flows. Channels change when streams flood due to the increased volume of water. The **floodplain** is the area that floods during high water.

The health of a stream is determined by the makeup of the **watershed,** or the lands found around a stream. The **riparian** zone, a parallel section of trees, shrubs, grasses and other plants along streambanks, promotes good stream health. These buffer zones help keep soils and chemicals from entering the streams. The dense root systems of trees also help reduce streambank erosion.

How people use and manage land and water impacts all rivers and streams. A stream is a product of the watershed and we all live in a watershed. Understanding stream dynamics helps us conserve and protect streams–today and in the future.

ACTIVITY

Streams, Pollutants and You

Overview

Students learn about the addition of harmful products to a stream and the need for their removal.

Objectives

After completing the activity, students will be able to:

1. Name a minimum of five harmful products to a stream. **1.10, SC8**
2. Explain how these products can harm stream inhabitants and people. **SC5**
3. Explain the need to remove harmful products from streams. **SC5**
4. Draw a picture that shows litter harmful to streams. **2.1, FA1**

Materials

Rivers and Streams poster, note cards or construction paper, crayons or markers, masking tape, Stream Team pamphlet

Preparation Time

20 minutes

Class Time

45 minutes

In this activity, students focus on stream pollution, the effects of litter on society, stream life and what students, as citizens, can do to clean up streams and prevent pollution.

Background

The healthiest streams are those unaltered by people. Many activities harm streams, including the **pollutants** that go into streams. Pollutants, such as oil, sewage, fertilizers, herbicides and pesticides, may not alter the appearance of the water, but they can have very obvious effects—fish kills, algal blooms and foul odors. The most obvious pollutant is **litter**. The effect of litter on stream health, and the plants and animals using the stream, is very significant.

Over the years, people have banded together to help clean streams and monitor their health. The Missouri Stream Team Program, sponsored by the Conservation Federation of Missouri, Missouri Department of Conservation and the Missouri Department of Natural Resources, has become a model for the nation.

Vocabulary Words

Litter: Material that is discarded in the water (or on the ground) or otherwise disposed of improperly or thoughtlessly

Pollutants: Any substances added to the environment that alter the character or quality of the environment and render it less suited for certain uses

The program provides citizens the opportunity to get involved in stream conservation. Stream Teams provide training and information to help you better understand and appreciate rivers and streams. Hands-on projects not only solve specific problems but further an understanding of how rivers and streams work. Projects involve controlling litter, stabilizing streambanks, planting trees along the streamside, creating fish and wildlife habitat and monitoring water quality.

Get involved with Stream Teams

Missouri's Stream Team Program is an excellent opportunity to get involved and show you care about Missouri's streams. You can take part in stream clean-ups and many other projects for stream conservation.

If you are interested in starting a Stream Team, call 1-800-781-1989 (message system), or check out the web site **www.mostreamteam.org**.

Procedure

1. Display the *Rivers and Streams* poster in the middle of the chalkboard. Ask students to identify some animals of the stream (such as birds, fish, insects, river otter, raccoon, deer and crayfish).

2. Ask students if the stream appears to be healthy. Explain that the appearance of clean water does not always indicate a healthy stream. Chemicals may enter a stream causing harm to the animals living there and the people using the stream. Tell students that these kinds of chemicals are called **pollutants**.

3. Give a large note card or piece of construction paper to each student. Ask students to draw one example of pollution they have found and might expect to find in a stream. Have them label their drawing and explain how this litter could harm the stream inhabitants or people who use the stream.

Litter Hurts

A **glass bottle** *might get broken, could cut people or wildlife that use the stream.*
Beverage cans *ruin the natural beauty of a stream; stream life may get caught in the opening.*
Tires *ruin the natural beauty of a stream; can release harmful chemicals into the water.*
A **car battery** *can release harmful chemicals into the water; ruins the natural beauty of a stream.*
Plastic six pack holders *can get caught in tree branches; lodged around animals' necks, legs.*
Fish line *can tangle around animals, cutting off circulation or binding them to logs or plants.*
Trash *can add harmful chemicals to the water; small objects can be swallowed by fish, causing internal damage; ruins the natural beauty of a stream.*
Shoes and other clothing *may smother aquatic plants or organisms.*
Plastic grocery bags *can become traps for animals.*

4. Provide each student a piece of masking tape. Ask each student to place their drawing on the chalkboard around the poster. Ask them how their litter might harm either the stream life or people who use the stream. See examples at right.

5. Review the kinds of pollution found in streams. Ask students for reasons why people discard litter in streams. Point out that there are many excuses. What excuses have you heard? How can you help? *(pack out trash, use trash cans, recycle)*

Assessment

1. General observance of student recognition of stream inhabitants.

2. Evaluation of drawings and descriptions.

Extensions

1. Visit a local stream and conduct a clean-up. Invite parents to participate in removal of the heavier items. Have students record their findings and accomplishments. Ask for volunteers to take photographs of the activities.

2. Lead a discussion of the Stream Team Program. Ask them if they would like to form a Stream Team. (It is not necessary to form a Stream Team to participate in stream clean-ups.)

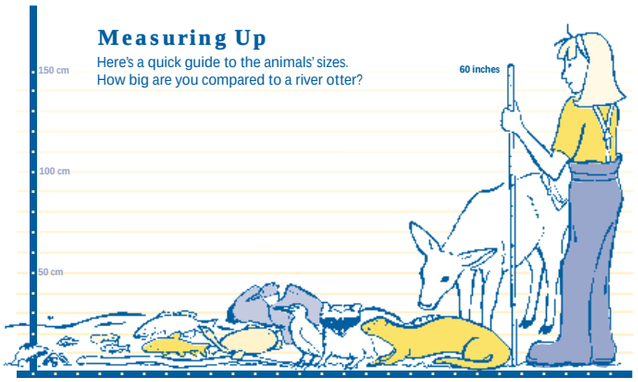
3. Have students create a display of some of the items recovered from a stream clean-up. Include explanations of how these items threaten people and streams.

Poster Key

1 River Otter
2 Raccoon
3 White-tailed Deer
4 Belted Kingfisher
5 Green Heron
6 Bullfrog Tadpoles
7 Smooth Softshell Turtle
8 Northern Water Snake
9 Bleeding Shiners
10 Rainbow Darter
11 Smallmouth Bass
12 Redhorse Suckers
13 Golden Crayfish
14 Hellgrammite or Dobsonfly Larva
15 Stonefly Nymph
16 Mayflies
17 Black Willow
18 Sycamore
19 Cottonwood

Measuring Up

Here's a quick guide to the animals' sizes.
How big are you compared to a river otter?



Plants & Animals

Growing with the flow

1. River Otter

Lutra canadensis

River otters are found in Missouri's rivers, streams and some lakes. They search for food in the water, catching crayfish, fish, frogs and other aquatic animals. They measure 89-130 cm (35-50 ") in length and weigh from 4.5-11.3 kg. (10-25 pounds). Otters are excellent swimmers, complete with streamlined bodies, webbed feet and water-resistant fur. Their ears and nose close when they go underwater, making them watertight. River otters use dens built by beavers, muskrats or other animals. Dens along the shore have openings above water in the summer and below water in the winter.

2. Raccoon

Procyon lotor

At home in hardwood forests, raccoons eat any plant or animal material they can find. They hunt crayfish, clams, frogs and small fish in streams. Raccoons measure 58-94 cm (26-38 ") in length and weigh 3.6-9 kg (8-20 pounds). Raccoons often wet their food in water to inspect it more closely. They are also well-adapted to urban habitats.

3. White-tailed Deer

Odocoileus virginianus

The white-tailed deer inhabits forest openings and edges. Their preferred foods are twigs, green leaves, nuts and fungi. In Missouri, the white-tailed deer is from 122-198 cm (54-78") long and may weigh from 45.4-136 kg (100-300 pounds) with the state record a 369-pound buck. Watch for deer tracks near streams where they have stopped to drink. The tracks look like two narrow teardrop shapes pressed into sand or mud.

4. Belted Kingfisher

Ceryle alcyon

An attractive bird, the belted kingfisher is large, about 33 cm (13") long. Watch for kingfishers hunting and diving for prey near rivers, streams, lakes, ponds and marshes. Using strong beaks, kingfishers are the only small birds other than terns that dive into the water for fish, tadpoles, salamanders, frogs and insects. Listen for the belted kingfisher's loud, rattling call.

5. Green Heron

Butorides virescens

The green heron, 38-56 cm (15-18") long, is recognized by its small size, dark underparts, bright orange or yellow legs and long, stout beak. Its call is a sharp, descending "keew." Watch for green herons along the wooded margins of ponds, swamps, rivers and streams. Because of the green heron's short legs, it stalks fish and other prey from water plants, low branches and shallow waters along the edges of ponds and streams. Green herons stalk silently, appearing as small logs until prey comes near.

6. Bullfrog Tadpoles

Rana catesbeiana

Bullfrog tadpoles breathe underwater and eat algae until they metamorphosize into air-breathing bullfrogs. The tadpoles transform into froglets in 11-14 months. They become adults in 2-3 years and grow to 90-150 mm (3.5-6"). Adult males sound their familiar "jug-o-rum" mating calls in summer. Many animals feed on tadpoles and frogs.

7. Smooth Softshell Turtle

Trionyx muticus muticus

Softshells feed on fish and other aquatic animals. They can grow up to 13-30 cm long (5-10"). Powerful swimmers, adult softshell turtles move quickly on land. Their shells are soft and leathery, bending freely at the sides and rear. Unlike other Missouri turtles, they do not have scales or scutes on their shells. They use their long neck and nose to breathe while hiding underwater. To escape winter temperatures and conserve energy, they dig into the mud at the bottom of river pools.

8. Northern Water Snake

Nerodia sipedon

The northern water snake is gray to brown with numerous dark brown bands or blotches. They feed on small fish but will also eat frogs, toads and tadpoles. They vary in length from 61-107 cm (24-42"). During spring and early summer, watch for northern water snakes basking on branches above the water or on logs along the shore.

9. Bleeding Shiners

Luxilus zonatus

Bleeding shiners get their name from the red coloring of their fins and head. They are a member of the minnow family, reaching a maximum length of 11 cm (3.5-4.5"). Bleeding shiners inhabit riffles and pools in clear streams with pebble or gravel bottoms. They occur in schools and eat insects found on the water's surface or drifting in the current.

10. Rainbow Darter

Etheostoma caeruleum

Rainbow darters live in swift riffles and spring branches. To survive, they need water with much oxygen and gravel, gravel-cobble or gravel-boulder bottoms. The force of the current against their large pectoral fins braces them on rocks. The male lives up to his colorful name. He is a rainbow of colors–with deep blue and orange-red bars covering his sides and bright blue and orange fins and throat. The female's color is more subdued. They move in quick dashes, hence the name darter. Darters are members of the perch family and average 3-7 cm (1-2.5") in length. Rainbow darters feed on snails, aquatic insects and crayfish.

11. Smallmouth Bass

Micropterus dolomieui

The smallmouth bass, a member of the sunfish family, occurs in clear, cool streams with gravel bottoms and low siltation. The fish prefers areas with good cover, especially near boulders, rootwads or vegetation. A smallmouth bass weighs about 680 g (1.5 pounds) and is 36 cm (13.5") long at five years of age. Smallmouth are distinguished from largemouth bass by–you guessed it–a smaller mouth.

To identify a smallmouth, look at the edge of its mouth, which comes to the rear margin of the eye. Young smallmouth feed on insect larvae and adults feed on fish and crayfish. Smallmouth are the main predator fish in streams where they are found.

12. Redhorse Suckers

Moxostoma erythrurum

The redhorse sucker, or golden redhorse, a member of the sucker family, is most abundant in clear, unpolluted streams with large, permanent pools and rocky riffles. The adults live in large schools. They usually do not live beyond six or seven years and reach a maximum length of about 43 cm (17") and a weight of 1 kg (2.3 pounds). Redhorse suckers, like other species of suckers, have mouths on the lower part of their heads and thick, fleshy lips. Suckers feed on aquatic insect larvae by sucking up the mud and soft organic matter from the stream bottom.

13. Golden Crayfish

Orconectes luteus

The golden crayfish, 8-10 cm (3-4") in length, is one of the most abundant and widely distributed crayfish in our state. It lives in streams with permanent water, rocky bottoms and beds of aquatic plants. The golden crayfish feeds on both live and dead plants and animals. Crayfish are an important food for many other animals including fish, snakes, turtles, wading birds, raccoons, otters and mink.

14. Hellgrammite Dobsonfly Larva

Family *Corydalidae*

Hellgrammites are the larval form of the dobsonfly. They range in length from 10-90 mm (.5-3.5"). Because of their size and importance as a fish food, they are often used as bait. Look for hellgrammites under stones in streams. Hellgrammites prey on small aquatic animals, including insects and small fish. If captured, their jaws can inflict a painful nip.

15. Stonefly Nymph

Order *Plecoptera*

Stonefly nymphs have long, flat bodies with two long antennae and two long tails. Stonefly nymphs are 8-50 mm (.3-2") in length. The adults are the same size as the nymphs. Look for the nymphs under submerged stones and other objects in streams with clear water. Stonefly nymphs feed on tiny animals and are an important food for fishes and other aquatic animals. Many flyfishing lures imitate the stonefly and are valued by trout anglers.

16. Mayfly

Order *Ephemeroptera*

Adult mayflies are found near water. The adults live only a day or two, but are very busy. They mate in flight, then the females drop 500 to 1000 eggs underwater. Adults do not need to eat, so their mouthparts are nonfunctional. Adults also molt two to three times in their short lives. Mayflies are an important food source in streams

17. Black Willow

Salix nigra

The black willow is frequently found in low, wet woods and along the borders of streams, sloughs and ponds. The trees are fast-growing and may attain a height of 20-30 m (70-80 ft.) and a diameter of .5-1 m (2-3 ft.). The fruits of the black willow are small, egg-shaped capsules about a quarter-inch long. The fluffy seeds are scattered by the wind. Black willows are one of the first tree species to grow on new riverbank soils. Roots of the black willow prevent soil erosion. The black willow has soft wood, browsed by deer and rodents and tapped by sapsuckers.

18. Sycamore

Platanus occidentalis

The sycamore is a fast-growing tree tolerant of wet soil conditions. It is most commonly found in wide groves on rich river bottomlands. Sycamores may reach heights of 20-30 m (65-90 ft.) and diameters of 1.5-2 m (5-6 ft.). The sycamore's fruit is a round ball up to 3 cm (1") in diameter. Once dry, the seeds float away or break apart and fly with the wind. The wood of a sycamore is hard, tough and almost impossible to split. Older sycamores become hollow and are excellent den trees for squirrels, raccoons and birds, while fallen trees become cover for fish.

19. Cottonwood

Populus deltoides

The cottonwood is also a fast-growing tree that thrives in moist soils along streams and rivers. It may attain a height of 20-30 m (65-98 ft.) with a diameter of 1.5-2 m (5-6 ft.). Cottonwood fruits are long clusters of capsules with seeds that fly away in a tuft of "cotton." Cottonwood leaves have flattened stalks and flutter at the slightest breeze, creating a gentle clamor. Many insects eat the leaves and fall into the stream, providing food for stream animals.

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